Volunteer Lake Assessment Program Individual Lake Reports

SWANZEY LAKE, SWANZEY, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	1,024	**Max. Depth (m):**	16.8	**Flushing Rate (yr^{1})**	0.8
Surface Area (Ac.):	117	**Mean Depth (m):**	5.5	**P Retention Coef:**	0.69
Shore Length (m):	3,400	**Volume (m^{3}):**	2,502,500	**Elevation (ft):**	524

TROPHIC CLASSIFICATION

Year	Trophic class
1986	MESOTROPHIC
2005	MESOTROPHIC

KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

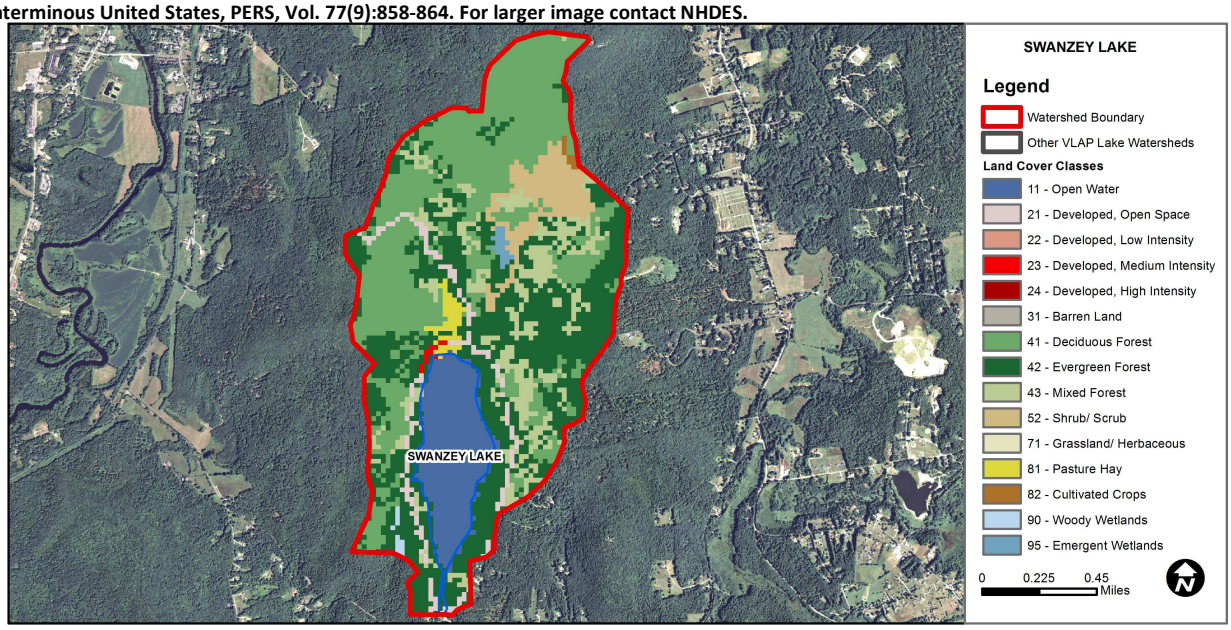
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator and the chlorophyll a indicator is okay.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Chlorophyll-a	Very Good	There are a total of at least 10 samples with 0 exceedances of indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

SWANZEY LAKE - CAMP SQUANTO BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
SWANZEY LAKE - RICHARDSON PARK TOWN BEACH	Escherichia coli	Bad	There are >=1 exceedance(s) of the geometric mean and/or >=2 single sample criterion exceedances. One or more exceedance is >2X criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	10.6	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	3.52	Deciduous Forest	33.2	Pasture Hay	1.18
Developed-Low Intensity	0	Evergreen Forest	34.38	Cultivated Crops	0.22
Developed-Medium Intensity	0.24	Mixed Forest	10.86	Woody Wetlands	0.28
Developed-High Intensity	0	Shrub-Scrub	5.22	Emergent Wetlands	0.48

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Swanzey Lake, Swanzey

2014 Data Summary

Observations and Recommendations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were low in June, increased to average levels in July, and then decreased to low levels in August. The 2014 average chlorophyll level increased slightly from 2013 and was less than the state median. Historical trend analysis indicates stable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot and tributary conductivity and chloride levels were approximately equal to the state medians, however historical trend analysis indicates significantly increasing (worsening) epilimnetic (upper water layer) conductivity since monitoring began.
- **E. coli:** Pine Inlet A and B and Outlet E. coli levels were much less than the state standard of 406 cts/100 mL for surface waters. Pilgrim Pines Beach E. coli levels were much less than the state standard of 88 cts/100 mL for public beaches.
- **Total Phosphorus:** Epilimnetic and Metalimnetic (middle water layer) phosphorus levels increased from low levels to average levels as the summer progressed. Average epilimnetic phosphorus increased sharply from 2013 but remained below the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years. Hypolimnetic (lower water layer) phosphorus was low in June and then increased to elevated levels in July and August. As the summer progresses, decomposition of bottom sediments uses up dissolved oxygen, and as dissolved oxygen levels decrease below 1.0 mg/L, phosphorus can be released from bottom sediments into hypolimnetic waters. This process is called internal loading and commonly occurs in NH lakes. Pine Inlet A phosphorus levels increased slightly from June to August but remained at low levels. Pine Inlet B phosphorus levels were slightly elevated but below average for the station. Outlet phosphorus levels remained low.
- **Transparency:** Transparency was below average for lake. June transparency was good despite recent significant storm events, July transparency decreased (worsened) due to weather and wave conditions, and August transparency further decreased due to wave conditions. Historical trend analysis indicates stable transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity levels were higher than average likely due to significant storm events and high water levels. Metalimnetic turbidity was also higher than average, potentially due to algal growth. Hypolimnetic turbidity increased as the summer progressed and organic compounds accumulated in hypolimnetic waters. Pine Inlet A turbidity was slightly elevated in July and August following significant storm events, however phosphorus levels remained low.
- **pH:** Epilimnetic and Metalimnetic pH levels were generally within the desirable range 6.5-8.0 units, however Hypolimnetic pH was less than the desirable range. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began.
- **Recommended Actions:** Significant storm events and high water levels throughout the summer likely resulted in the higher epilimnetic phosphorus and turbidity levels. This highlights the importance of managing stormwater runoff from lake and watershed properties. DES' "NH Homeowner's Guide to Stormwater Management" is a great resource for homeowner's. Keep up the great work!

Table 1. 2014 Average Water Quality Data for SWANZEY LAKE

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m NVS	Turb. ntu	pH
Epilimnion	5.90	3.71	4	45.3		7	3.71	0.94	6.86
Metalimnion				45.7		10		1.17	6.58
Hypolimnion				49.5		18		2.53	6.24
Outlet				48.1	13	6		0.92	6.79
Pilgrim Pines Beach					6				
Pine Inlet A			3	43.6	40	9		1.43	6.55
Pine Inlet B			3	31.0	80	18		0.90	6.44

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Worsening	Data significantly increasing.	Chlorophyll-a	Stable	Trend not significant; data show low variability.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Stable	Trend not significant; data show low variability.
			Phosphorus (epilimnion)	Stable	Trend not significant; data moderately variable.